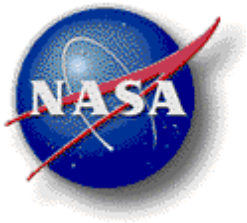
International Space Station Program

Risk Management Plan

April 10, 2002



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INTERNATIONAL SPACE STATION PROGRAM

SSP 50175 Rev. A

RISK MANAGEMENT PLAN

April 10, 2002

CONCURRENCE

Prepared By:	Philip J. Brezovic ISS Program Senior Risk Analyst	OE ORG
	/s/ Philip J. Brezovic SIGNATURE	05-17-02 DATE
Concurred By: (NASA)	Jeevan Perera ISS Program Risk Manager	OE ORG
	/s/ Jeevan Perera SIGNATURE	05-17-02 DATE
Concurred By: (NASA)	James Wade Deputy Manager, Safety and Mission Assurance/Program Risk	OE ORG
	/s/ James Wade SIGNATURE	05-17-02 DATE
Approved by: (NASA)	Jerry B. Holsomback Manager, Safety and Mission Assurance/Program Risk	OE ORG
	/s/ Jerry Holsomback SIGNATURE	05-17-02 DATE
DQA (NASA)	Ann Wood Configuration Management Representative	OL ORG
	/s/ Ann Wood SIGNATURE	05-20-02 DATE

PREFACE

The contents of SSP 50175, International Space Station Program Risk Management Plan, apply to NASA and its contractors. This document is under the control of the International Space Station Program (ISSP) Safety and Mission Assurance/ Program Risk Management (S&MA/PRM) Office. NASA will approve any changes or revisions.

/s/ Jeevan Perera 05-17-02

Jeevan Perera, Ph.D., J.D. Date
Manager, Program Risk Management
Safety & Mission Assurance/Program Risk Management Office
International Space Station

SSP 50175
INTERNATIONAL SPACE STATION PROGRAM
RISK MANAGEMENT PLAN
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CONCURRENCE

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1.0 INTRODUCTION

The International Space Station (ISS) is an extremely complex system, both technically and programmatically. The Space Station must support a wide range of payloads and missions. It must be launched in numerous launch packages and be safely assembled and operated in the harsh environment of space. It is being designed and manufactured by many organizations, including NASA, its prime contractor, and many international partners. Finally, the ISS has multiple customers, (e.g., the Administration, Congress, users, public, international partners, etc.) with contrasting needs and constraints. It is the ISS S&MA/PR Office strategy to proactively and systematically manage risks to help ensure ISS Program success.

1.1 Purpose

The purpose of this document is to provide personnel across the program with a clear, concise description of how the ISS Program will manage risk. This document is organized as follows:

- ?? An overview of the continuous risk management process.
- ?? The standard role of every organization in risk management.
- ?? Details on how to effectively utilize the risk management functions and processes.

This document describes the methodologies and processes used to identify, analyze, plan, track, control, communicate and document the ISS Program's risks. The identification, characterization, mitigation plan, and mitigation responsibilities associated with specific risks are contained in the ISS risk database and specific risk mitigation or contingency plan documents.

1.2 Scope

This document is applicable to the entire NASA ISS Program.

1.3 Precedence

In the event of any conflict between this document and the Station Program Implementation Plan, SSP-50200, the latter will take precedence.

1.4 Delegation of Authority

This document is under the control of the ISS Safety and Mission Assurance/Program Risk Office.

2.0 DOCUMENTATION

Document No.	Title
NPG 7120.5A	NASA Program and Project Management Processes and Requirements
SSP-50200	Station Program Implementation Plan (SPIP)
ISSP-JPD-306B	Establishment of the Program Risk Management System (PRMS)
MGT-OE-020	Work Instruction for ISS Risk Management Process
MGT-OA-010	Work Instruction for ISS Corrective Action/Preventive Action (CAPA) Process

Table 1 – Reference Documents

3.0 ISS CONTINOUS RISK MANAGEMENT STRATEGY

The purpose of risk management is to identify risks and threats early in the program so that appropriate mitigation plans may be developed and implemented to reduce the consequences of the risk or likelihood that the risk will occur. This Continuous Risk Management (CRM) process provides systematic methods for identifying, analyzing, planning, tracking, controlling, communicating, and documenting risks on a continuous basis.

The strategy of the ISS Program to manage risk is to:

a. Embed risk management processes into normal day-to-day activities to identify and help manage all risks and potential threats.
b. Delegate risk-management responsibility to the lowest possible organization with the allocated resources to mitigate or authority to accept the risk.
c. Dedicate a Program Risk Management organization to lead program-level risk-management activities, facilitate the risk-management processes, and provide analytical support and tools including Probabilistic Risk Assessments (PRAs), ISS Risk Management processes training and other risk-management assistance to managing organizations.
d. Provide the necessary costs and funding analysis to address all risks and potential threats to the ISS.
e. Integrate the risk cost and schedule process within the risk system.

All ISS program management organizations are responsible for performing the following functions (the CRM Paradigm), see Figure 1:

a. Identify: specify potential problems to the program
    - ?? Arrive at a concise description of the risk, which can be understood and acted upon.
b. Analyze: evaluate and prioritize risks based on the Risk Management Plan.
    - ?? Classify and group risks to help to understand the risks
    - ?? Assess probability and consequences of occurrence (technical, schedule & cost) and score using the risk matrix tool
    - ?? Prioritize the risks based on defined criteria
    - ?? When allocating resources, prioritize to determine which risks should be dealt with first
c. Plan: develop an action plan and allocate resources based on prioritization of risks
    - ?? Assign responsibility
    - ?? Determine the approach to use (research, accept, watch or mitigate) the risk

?? Define scope and action plan

d. Track: watch and track risk attributes and mitigation plans
   ?? Watch and mitigate risks as related data are acquired, compiled, analyzed, and reported.
   ?? Use reports to communicate information (quantitative and/or qualitative) required for effective control decisions.
   ?? Risk tracking should include use of metrics.
e. Control: process in which decisions are made based on the data presented in the tracking reports. This ensures that the risk is continually and effectively managed.
   ?? Decisions are based on current information as well as experience and must respond to changing conditions.
   ?? Risk decisions and control mechanisms should be integrated with standard project management practices.
   ?? Utilize tracking data and trends to determine how to proceed with risks (close, continue tracking and executing the current plan, replan, accept the risk, or invoke a contingency plan).
f. Communication and Documentation: provide information and feedback to the program on risk activities, risk status, and new potential risks
   ?? Ensures the visibility of risk information for better management
   ?? Document all risk information in the risk database

Figure 1 – ISS Continuous Risk Management Process

The ISS Safety and Mission Assurance/Program Risk Office will perform the following functions:

a. Provide to the other organizations:
   (1) Standard risk-management processes and to7ols.
      ?? Risk database for managing and communicating risk (see 6.1).
      ?? Risk scoring tool for assessing risks (see 6.3).
      ?? Decision trees tools for structured decision-making that considers all facets of risks (see 6.5).
      ?? Probabilistic Risk Assessment (PRA) as directed by NASA management for identification, assessment, planning and control of risks (see 6.6).

?? Cost risk coordination (see 6.7).
?? Other tools or products as needed.

(2) Training
?? Risk Summary Card for quick reference (see 6.3).
?? Web-based/Computer-based Training.
?? Continuous Risk Management (CRM) process training for ISS managers, Managing Organizations, ISS team leads and risk application users (see section 3.0).
?? Other forms of training as needed (see 7.0).

(3) Representatives in managing organizations to provide support (see 5.5).
(4) Metrics which track the results of the ISS program risk-management processes (see 6.4).

b. Develop the overall ISS program risk posture (see 6.2).
c. Support the Program Risk Advisory Board (PRAB) held a minimum of every six weeks or called by the ISS Program Manager (see 5.3).
d. Facilitate organizations to identify and assess risks, which transcend the responsibilities of their organization.
e. Support program-level risk management by:
(1) Performing detailed assessments and cost/schedule analysis on top program risks.
(2) Perform other tasks assigned by the ISS Program Management Office.
(3) Use industry accepted tools and techniques for continuous risk management including those listed in Figure 2.

Figure 2 – Tools and Techniques for Continuous Risk Management

The Chief Engineer Office is responsible for assessing technical adequacy of the International Space Station Program. This office provides oversight and review of all technical activities to ensure that designs being developed satisfy requirements and that test and analytical verifications are adequately planned and conducted. The Chief Engineer is also responsible for instigating and conducting independent engineering assessments for design reviews and other technical program milestone events.

The Independent Assessment Office and Systems Management Office provides insight required to independently evaluate safety and mission success factors for the International Space Station. These assessments cover the health and status in key areas of design, engineering processes, manufacturing,

assembly, and operational mission capabilities. These activities assist in identifying key programmatic risks.

Risks are identified and whenever possible are communicated to the responsible managing organization. In the unlikely event that a risk has no ownership, the PRAB will assign a responsible managing organization. The PRAB will also oversee the effective integrated management of risks and watch items while facilitating the coordination of mitigation plans.

4.0 STANDARD ISS MANAGING ORGANIZATION RISK PLAN

This section describes the standard role of every ISS managing organization (MO) in risk management. For a diagram/schematic of the top-level managing organizations, see Figure 5. The purpose of risk management is to identify risks early in the program so that appropriate mitigation plans can be put into place to effectively reduce the risk or prevent the risk from occurring. The risk management process provides systematic methods for identifying, analyzing, planning, tracking, controlling, and communicating/documenting risks.

The managing organizations shall use the ISS risk database to manage and communicate risk data. A characterization of each risk, its matrix location, and the mitigation tasks shall be entered into this database. Managing organizations shall use this application to communicate risks to higher-level managing organizations and monitor risks of lower-level managing organizations.

Every managing organization shall periodically (as needed) assess current and planned activities to identify specific areas of risk to meeting the managing organization's objectives. Each risk will be analyzed using the ISS Risk Summary Card (Annex A) to determine its magnitude based on likelihood of occurrence and consequences if it did occur. Individual risks will be plotted on a risk matrix to provide a visual representation of the relative importance of each risk so that the managing organization and program management can readily determine where intervention or resources are required.

The managing organization is responsible for performing risk management for all of the activities under its purview. The Safety and Mission Assurance/Program Risk Office will provide training in risk tools and techniques, aid in implementing the risk-management process, provide assistance in performing risk assessments, trade studies, and decision analysis.

5.0 PROGRAM RISK MANAGEMENT PROCESS

This section provides details on the functions of risk management identified in the preceding sections.

5.1 ISS Program Risk Management Definitions

Watch Item (WI) – A WI is an internal organization/team issues or open work item. WIs can be abated with existing team resources and processes. When managed within the normal scope of business, WIs will not affect the safety of flight, ISS Program budget, crew health, integrity of the hardware and/or software, or mission success.

Risk - An ISS Program "Risk" is any circumstance or situation that poses a threat to, crew or vehicle safety, program cost, program schedule, or major mission objectives, and for which an acceptable resolution is deemed unlikely without focused management effort. Agreements between the International Partners that are not being fully implemented must be documented as risks in the ISS risk database. The ISS risk database is the application used to enter risks, track risks and produce the necessary status reports for the ISS program management.

Top Program Risks (TPRs) - TPRs are risks that significantly affect the safety of flight, ISS Program budget, crew health, integrity of the hardware and software, or mission success. TPRs pose a threat to launch dates and/or require significant Program resources and attention.

5.2 ISS Program Risk Management Process

The risk management process will promote the use of risk management techniques and tools in making decisions. The process must require all associated personnel to bring risk information within the risk management infrastructure. Specifically, the risk process should assess continually what could go wrong (risks), determine which risks are important to deal with, implement strategies to deal with those risks, and measure effectiveness of the implemented strategies. The benefits of implementing an effective risk management process include increasing the likelihood of mission success, assisting the program in understanding what can go wrong, enabling better use of resources through prioritization, and promoting teamwork, communication, and smart cost effective, decision making. Risk management should permeate throughout all facets of project management, as seen in Figure 3.

Figure 3 – Risk Management Coverage

The risk management process provides a single integrated system for communicating ISS Program risks to all Program participants and to the Program Risk Advisory Board (PRAB), see Figure 4.

The following steps define the process flow for addressing Watch Items that could become Risks that could become Top Program Risks (TPR).

1. A Watch Item (WI) is identified through the normal course of business or daily operations of the ISS program. The WI becomes an ISS risk if there is significant concern by ISS Managing Organizations (MOs) to address this issue or concern in a formal board or panel.
2. The WI is brought to the Managing Organization (see section 5.5) board or panel. If the WI is determined not to be a risk, then the MO tracks it separately as a watch item.
3. If the WI is determined to be a risk, then it is assigned to a Risk Owner (RO) by the MO board/panel, and the RO is held responsible for developing an abatement plan for and entering the risk into the ISS risk database.
4. The MO tracks the risk in the ISS risk database and is responsible for effective management of the risk. The mitigation/abatement plan, developed to mitigate the risk, must be implemented and maintained current.
5. The risk abatement plan is followed until the risk is closed. The risk is closed when all abatement tasks have been completed and the MO agrees to close the risk at a board or panel. The MO or RO closes the risk in the ISS risk database.
6. If the risk requires focused ISS Program management attention (based on consequence and likelihood or based on Program Manager's discretion), then the MO elevates the risk in ISS risk database and presents the risk to the attention of the Program Risk Advisory Board (PRAB).
7. If the PRAB or ISS Program Management determines that the risk is not a TPR then the risk is returned to the MO/RO for additional abatement planning or action and continued management.
8. If the MO determines that the risk is a TPR candidate, then the members of the PRAB determine the validity of the risk and elevate the risk to a TPR, if appropriate. The ISS risk database is updated after the PRAB.
9. The PRAB/Space Station Program Control Board (SSPCB) then determines an abatement plan (through coordination by the MO and/or RO) to mitigate the risk and the abatement plan is entered into ISS risk database and tracked by the MO/RO. The PRAB assigns resources to effectively manage the risk.
10. When all abatement tasks have been met or accomplished, the PRAB closes the TPR. The MO accomplishes this action in the ISS risk database. The PRAB may also accept the TPR. Accepting the TPR means that the ISS Program Manager/Office cannot implement a cohesive abatement plan or that the resources required do not warrant further management of the risk.
11. The MO continues the abatement process for the TPR with periodic updates. This process continues until ISS Program Management closes, accepts or mitigates to a level below a TPR (as determined by the ISS Program Manager. Either acceptance or closure action is accomplished by the MO and documented in the ISS risk database.

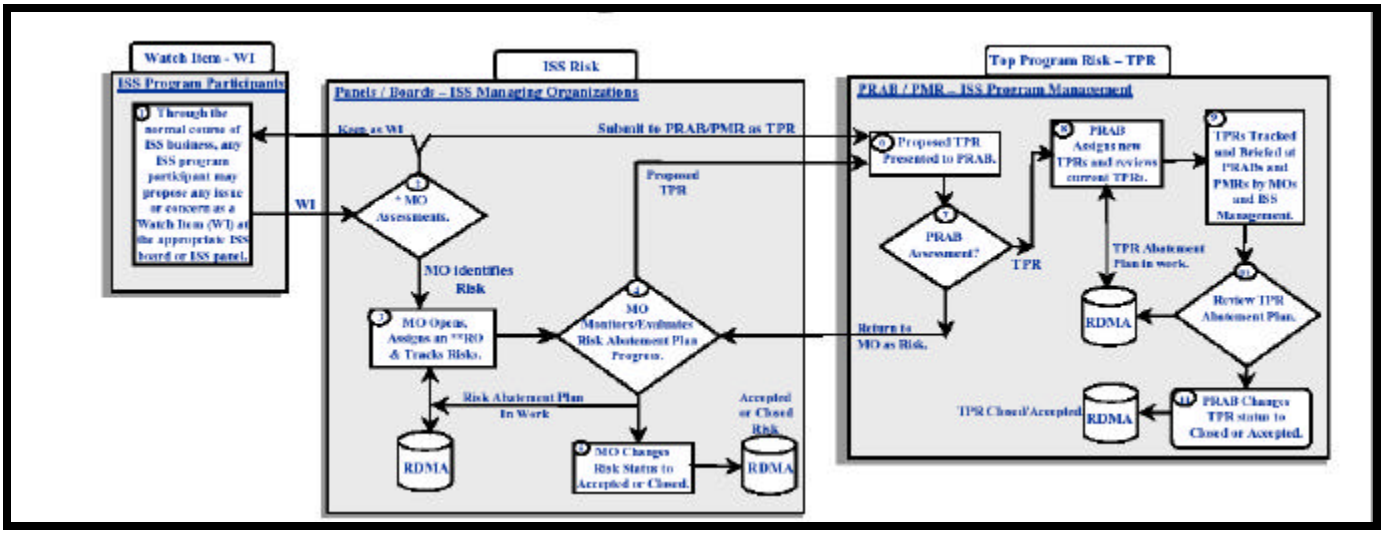

Figure 4 – ISS Program Risk Process

5.3 Program Risk Advisory Board

The PRAB, which is chaired by the ISS Program Manager, assists in the management of program risks. The PRAB consists of representatives from each managing organization, the Chief Engineer, Human Exploration and Development of Space (HEDS), S&MA, Independent Assurance, International Partners, and other appropriate centers. Other ISS associated offices or teams may be required to present their risks and watch items (WI) at the PRAB as requested by the ISS Program Manager. These offices or teams will identify or manage risks/watch items through coordination with ISS program boards and panels as required.

At each PRAB, the ISS risk database will be utilized to review the top ranked risks of each managing organization. The PRAB shall review the risk magnitudes from the Program Manager's perspective, making changes as appropriate. The ISS Program Manager will scrutinize the management of all risks and assign resources and actions as appropriate. The PRAB shall review the resulting top program ranked risks in the order of Likelihood times Consequence (L x C) and shall order risks with the same L x C methodology. Mitigation plans and status will be reviewed and/or revised including additional risk-mitigation activities.

The Chief Engineer, HEDS S&MA Independent Assurance, Systems Management Office or other ISS related organization, board or panel will present to the PRAB any risks, which they feel lack ISS program managing organization ownership or sufficient management attention. The PRAB will facilitate management of all risks and if required, will assign a risk owner, see Figure 4.

5.4 Program Risk Management Integration

The S&MA/PR Office is responsible for the coordination of all the ISS risk management products, processes, and tools. This office also coordinates any special risk activities requested by ISS Program management. The S&MA/PR Office shall meet weekly, except one week prior to the PRAB. The S&MA/PR Office ensures that schedules, new products, and tools are reviewed, and risk management process issues are decided by ISS Program management and the managing organizations.

One of the activities that occur at the weekly S&MA/PR Office meetings is the communication of risk data between ISS risk representatives. The purpose of this is twofold: (1) it serves to provide risk representatives with an awareness of program risk; (2) it allows risk representatives to communicate this information to their respective managing organizations, thus facilitating horizontal integration of risk data.

The S&MA/PR Office will implement a series of work instructions and training procedures to describe internal processes (tools applications, risk analyses, managing organization interactions, etc.). These work instructions will be documented in the S&MA/PR Office managing organization's ISS Program Implementation Plan and will be available to assist other managing organizations to understand the detailed functioning of the S&MA/PR Office and to incorporate similar or complimentary processes.

5.5 Program Risk Management Representatives from Managing Organizations

The Program Risk Management (PRM) representatives are assigned by each respective managing organization. The PRM representative's primary objective is to assist the managing organization in implementing common risk-management practices into the managing organization's normal processes and help facilitate the identification and management of risks and watch items. The representatives are charged with ensuring that risk management processes are understood and implemented consistently across the program. Specifically, the PRM representative will:

a. Ensure that all managing organization members have a thorough understanding of the theoretical constructs that form the basis for the ISS Program risk management process.
b. Be cognizant of the ISS tool sets for performing basic risk management functions. These tools include the ISS risk database, risk matrix scoring tool, decision trees, and probabilistic risk assessment tools.
c. Provide multi-level risk management familiarization.
d. Assist the managing organization in implementing the ISS program risk management process.
e. Assist the managing organization in formulating mitigation and contingency plans.
f. Assist the managing organization in performing overall technical analyses, problem solving, and decision-making process by including the consideration and impacts of risk.
g. Assist in tracking risks by entering into the ISS risk database and ensuring completeness of the data.

The organizational structure of the ISS Program office is shown on Figure 5. Each of these offices or organizations is defined as a top level Managing Organization (MO).

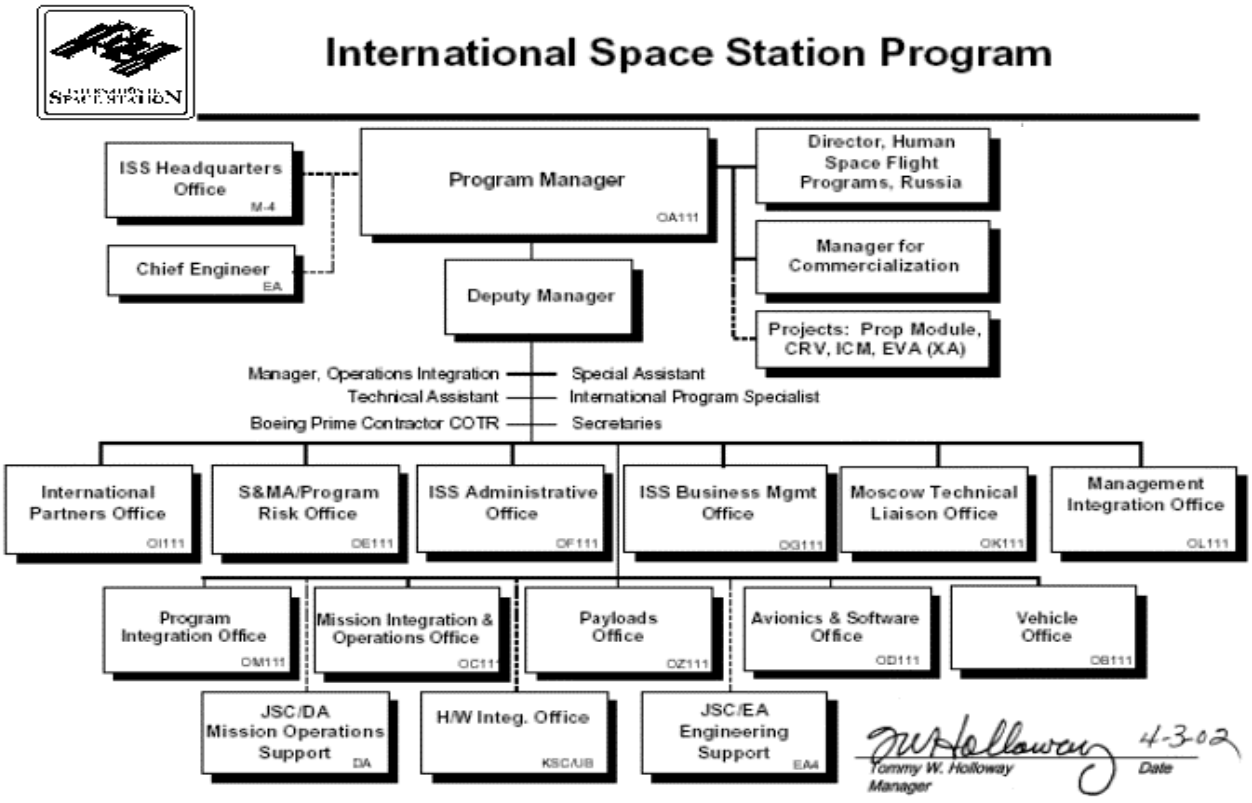

Figure 5 – ISS Managing Organizations

The ISS Program has assigned risk representatives to top program-managing organizations, see the following web site for a current table: PRAB P.O.C. List

6.0 PROGRAM RISK MANAGEMENT TOOLS

6.1 ISS Risk Database

The ISS program office uses an integrated risk management database called ISS Risk Management Application (IRMA) to manage risks and communicate risk data throughout all ISS managing organizations. A characterization of each risk, its matrix location (severity), and the mitigation tasks are entered into this database. Managing organizations use this database application to effectively manage and track each risk and to gain insight into impacts from other managing organization risks. All cost issues are tracked in detail through this database. The ISS risk database shall be the ISS program-wide risk database. All Program managing organizations from the Program Manager to an organization's sub-level shall use ISS the risk database to:

a. Identify, document and record the status of the managing organization's risks.
b. Review and mitigate their sub-organizations' risks.
c. Communicate risks vertically and horizontally throughout the ISS organization.
d. Produce the necessary reports (database generated and special request generated reports) to the ISS Program and NASA management.

The ISS risk database shall provide an organization-oriented view of risks in a program-wide consistent format. When reviewing sub-organization risks, a managing organization can provide comments to the sub-organization via the ISS risk database. Higher-level managing organizations can create parent risks which link to lower-level risks owned by other managing organizations.

To enhance communication of risks to all managing organizations affected, all ISS risk database users may view the entire database. However, only the responsible managing organization may update their risk. If requested, S&MA/PR Office will update risks in coordination with the responsible managing organization.

Items in the database are tiered. Low-level items that lack definition or are too far "over the horizon" are labeled "Concerns." More detailed/defined items are known as "Watch Items". Top-level issues are defined as "Risks." Each level requires higher levels of authorizations and scrutiny, see Figure 6.

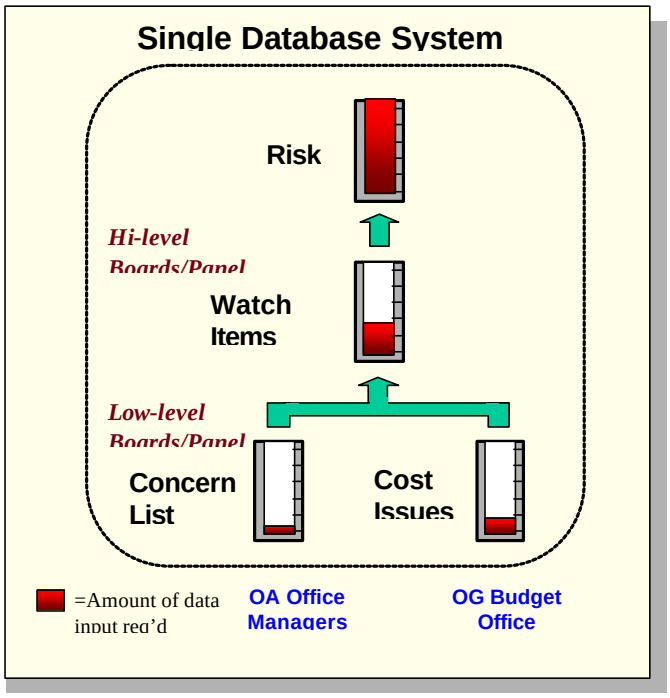

Figure 6 – Tiered Level Database

IRMA facilitates each ISS managing organization's review of sub-organization risks. When a managing organization reviews its sub-organization risks, it records whether it agrees with the data and whether it chooses to elevate that risk. Risks at that level will be reviewed by the Program Risk Advisory Board and may be given resources to mitigate the risk. At each level of elevation, managing organizations can assign their own score and rank after considering the more global aspects of the risk.

The ISS risk database is intended as a day-to-day tool for organizations to manage their risks. As a minimum, however, managing organizations are expected to review their risks and their sub-managing organizations' risks bi-weekly (at their respective board/panel) or as otherwise required. Managing organizations should coordinate the timing of their review (lowest managing organizations first) to enable a rapid elevation capability.

The managing organization generates mitigation plans for risks as appropriate. Each mitigation plan includes the specific tasks that will be conducted to either decrease the likelihood of the risk occurring or lessen the severity of the consequences. As each mitigation task is completed, the responsible managing organization records the completion of the task in IRMA and re-scores the risk considering the task's results (the effects on the risk). By keeping scores updated, a managing organization's current top risks can be readily identified or the status of any risk in the system.

A number of metrics measure program risk-management trends using data contained in the IRMA. This allows for trend analysis to further identify new potential risks and assist in the management of all risks. The metrics will also scrutinized the effectiveness and compliance in the ISS Risk Management Process by individual organizations.

The ISS risk database is an evolving tool and will be continuously improved with capabilities requested by ISS managing organizations to more effectively and efficiently manage and communicate risks. In this

effort, S&MA/PR Office shall be responsible for both the ISS risk database development, administration, training, and user support, and promoting use of ISS risk database and establishing usage metrics and goals.

6.2 Program Risk Posture

Each month, the S&MA/PR Office shall report the program risk posture. This shall consist of:

a. The top Program risk list approved by the PRAB.
b. The PRM risk metrics (see paragraph 6.4).
c. The status (sufficiency and integrity) of the data within the ISS risk database.

The program risk posture shall be presented at the PRAB for approval.

6.3 Risk Summary Card

The ISS Risk Summary Card (see Annex A.) shall provide a quick overview of the risk management process and the risk-scoring tool. It shall provide guidelines and checklists for all steps in the risk management process and definitions and scoring (likelihood & consequence) for risks. The card is available to all program personnel from the S&MA/PR Office or the Program Automated Library System (PALS).

The standard risk-scoring tool of the ISS Program is the risk matrix. This tool provides a way all program-managing organizations can consistently measure risk likelihood, consequence, and magnitude. It allows risks to be ranked relative to other risks to help determine risk mitigation priority. Individual risks can be plotted on the matrix itself to provide a visual representation of their relative magnitudes and importance.

6.4 Metrics

A number of metrics will be used to measure program risk-management trends using data contained in ISS risk database. The following metrics may be used:

a. Number of new risks entered.
b. Number of high, medium, and low risks.
c. Frequency of managing organization updates.
d. Frequency of parent managing organization reviews.
e. Average time to develop mitigation plans for top risks.
f. Number of high, medium, and low risks without mitigation plans.
g. Percent mitigation tasks completed.
h. Percent mitigation tasks completed on time (planned date vs. estimated completion date (ECD).
i. Number of risks with missing or incomplete data.

Metrics will be reported as part of the monthly program risk posture status report (see 6.2).

6.5 Decision Trees

Decision trees provide an organized method for structuring complex decisions and identifying the best available option. Decision trees capture the logical, sequential progression of events that will occur during the decision process. The decision tree decomposes complex problems into a series of smaller, solvable sub-problems. This tool provides the decision maker an avenue to illustrate to others the decision process via the options available to the decision maker, the future events that can occur, the relationships between those options and events, and the selected option in a graphical manner. Decision trees support program management's desire for knowledge capture and decision tracking.

6.6 Probabilistic Risk Assessment

The S&MA/PR Office shall develop and maintain a Probabilistic Risk Assessment (PRA) for the ISS. The PRA results will be used to develop ISS trade studies to aid in decision-making process in support of design, operations, and upgrade alternatives. The ISS PRA also captures possible accident scenarios that may lead to several undesired consequences called "end-states". The ISS PRA goals are to examine those end-state scenarios that can lead to:

- ?? Catastrophic loss of the Station
- ?? Loss of a Station crewmember/injury of a Station crewmember
- ?? Loss of a vital Station system
- ?? Loss or shutdown of a Station pressurized module
- ?? Situations requiring Station evacuation
- ?? Loss of Station related science

The PRA model calculates the probability of reaching these end states and the statistical uncertainty associated with each. The level of detail is modeled to the ORU level.

6.7 Cost/Schedule Risk Coordination

In identifying and assessing risks, managing organizations can use probabilistic cost and schedule models to deal more effectively with inherent cost and scheduling uncertainty. These models will also allow managing organizations to more effectively consider cost and schedule in decisions.

The cost/budget threats must be coordinated effectively with program risks. Cost issues and risks must all be tracked and managed together in an efficient process. This integrated approach should document, rank, review and manage all risks including all cost and schedule impacts to the program.

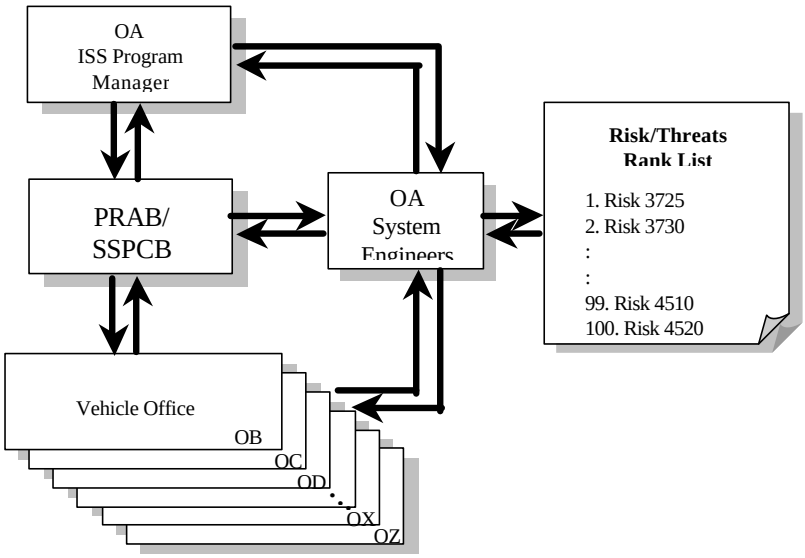

Figure 7 – Force Rank Process

This integrated approach should document, rank, review and manage significant risk cost impacts to the program. A "force ranking" system will be used which will prioritize all risks/threats relative to program importance. This will facilitate a more organized and timely review of the risks in the program, which may require financial reserves to resolve. In addition, this will assist in making management decisions that span several years by ensuring reserves are allocated based on multi-year prioritizations. An independent system-engineering group within the ISS Program Office (OA) will coordinate with the S&MA/PR Office and Business Management Office to help determine this "forced ranking," by independently evaluating each risk (see Figure 7). This team would look at all facets of the risks/threats including schedule, technical and costs impacts and develop a prioritization list of all threats/risk after consulting with ISS Program management and all managing organizations.

7.0 PROGRAM RISK MANAGEMENT TRAINING

The S&MA/PR Office will provide training information and instruction in risk management and aids for decision-making. Personal instruction will be available for individual managing organizations from their PRM representative. These are located under the "Risk Management - tools and training" heading on the JSC website. In addition, any group requesting instruction will be supported by briefings or customized training.

APPENDIX: LIST OF ACRONYMS

CRM	Continuous Risk Management
CA	Corrective Action
CAPA	Corrective Action Preventive Action
HEDS	Human Exploration and Development of Space
IP	International Partners
IRMA	ISS Risk Management Application
ISS	International Space Station
ISSP	International Space Station Program
L x C	Likelihood Times Consequence
MO	Managing Organization
NASA	National Aeronautics and Space Administration
OA	Mailcode for International Space Station Program Office
PR	Program Risk
PRA	Probabilistic Risk Assessment
PRAB	Program Risk Advisory Board
PRACA	Problem Resolution and Corrective Action
PRM	Program Risk Management
PRMS	Program Risk Management System
RM	Risk Management
RO	Risk Owner
SSPCB	Space Station Program Control Board
S&MA	Safety and Mission Assurance
TPR	Top Program Risk
WI	Watch Item

Annex A: ISS Program Risk Management Process Card

ISS Risk Summary Card ISS Program Risk Management

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RISK DEFINITIONS

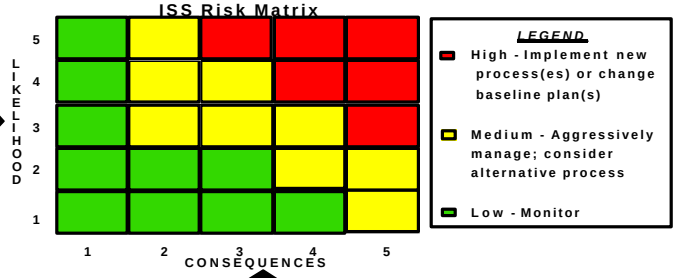
RISK: An ISS Program Risk is any circumstance or situation that poses a threat to: crew or vehicle safety, Program controlled cost; Program controlled schedule; or major mission objectives, and for which an acceptable resolution is deemed unlikely without a focused management effort. Agreements between the International Partners (IPs) that are not being fully implemented must be documented as ISS risks. (ISSP JPD 306)

RISK MANAGEMENT: An organized, systematic decision-making process that efficiently identifies risks, assesses or analyzes risks, and effectively reduces or eliminates risks to achieving program goals. (ISSP JPD 306)

RISK DATA MANAGEMENT APPLICATION (RDMA): The ISS database used to track ISS risks and provide ISS risk status reports to the ISS Program Management.

LIKELIHOOD — *What is the likelihood the situation or circumstance will happen?*

Level	Probability	. . . or - the current process . . .
5	Very High	cannot prevent this event, no alternate approaches or processes are available.
4	High	cannot prevent this event, but a different approach or process might.
3	Moderate	may prevent this event, but additional actions will be required.
2	Low	is usually sufficient to prevent this type of event.
1	Very Low	is sufficient to prevent this event.



Risk Consequence Scoring Terms

1. Cost is defined as the dollar amount required to abate the risk, not the cost of the risk if it occurs.
2. Schedule definitions: Level 2 Schedule relates to ISS hardware delivery dates and Level 1 Schedule relates to ISS launch dates.
3. Technical definition includes everything that is not cost and schedule: e.g., safety, operations, programmatic.
4. Cost, Schedule and Technical Consequences can exist concurrently and are not mutually exclusive.
5. Risk scoring is accomplished by "multiplying" Likelihood X Consequence. When determining risk consequence among Cost, Schedule and Technical, the highest score is represented on the ISS Risk Matrix as a single score value.

CONSEQUENCE — *What is the Consequence (Cost, Schedule or Technical) of this ISS Risk?*

Level	1	2	3	4	5
Cost	Minimal Impact of < $100K	Budget Increase between $100K and $1 Mil.	Budget Increase between $1 Mil and $10 Mil.	Budget Increase between $10 Mil and $50 Mil.	Budget Increase of > $50 Mil.
Schedule	Minimal or No Impact	Additional Activities Required. Able to Meet Need Dates	Level 1 Schedule or Level 2 Schedule Milestone Slip of ≤ 1 Month.	Level 1 Schedule or Level 2 Schedule Milestone Slip of ≥ 1 Month, or Program Critical Path Impacted	Cannot achieve Major ISS Program Milestone.
Technical	Minimal or No Impact	Moderate Reduction, Same Approach Retained	Moderate Reduction, But Workarounds Available	Major Reduction, But Workarounds Available	Unacceptable, No Alternatives Exist

ISS Risk Summary Card ISS Program Risk Management

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1. Identify	A. Early identification & management methods include: Budgetary Reviews, Expert interview, Trend Analysis of Metrics, Comparison of goals and plans, Project Manager's analysis and reviews, Engineering analysis and Trade Studies. B. Key areas to assess include: Budget, Requirements, Technology, Management, Engineering Supportability, Logistics and Maintenance, Operations, Safety, Programmatic, Political. C. Information Sources: Metrics, Historical Data, Resources, Suppliers, Plans, Proposed Changes, Test Results. D. Is consideration given to all ISS Program sources for identifying risks?
2. Analyze	A. Perform detailed engineering analysis. B. Perform trend & sensitivity analysis. C. Determine the likelihood of event. D. Determine the item's consequences: • Technical issues include: Performance, Operations, Crew Safety and Health, Programmatic Concerns, Logistics and Maintenance. • Cost issues includes: Program budget, Program threats, Program resources. • Schedule E. Plot the risk on ISS Risk Matrix. F. Enter the risk & analysis data into the ISS risk database.
3. Plan	A. Conduct a trade study to identify the best risk abatement plan. B. Develop the risk abatement plan to: Reduce likelihood of occurrence, reduce severity of consequences, redesign, develop prototypes, modify requirements, acquire resources, augment test or analysis, re-negotiate, re-deploy spares. C. Develop contingency plans. D. Recommend elevating risk to higher board/panel. E. Enter abatement plans into RIMA and keep update. F. Are the mitigation plans adequate? G. When all risk mitigation fails, consider accepting the risk.
4. Track	A. Watch and track the risk attributes and mitigation plans. B. Watch and mitigate risks as related data are acquired, compiled, analyzed, and reported. C. Use tracking reports to communicate information (quantitative and/or qualitative) required for effective control decisions. D. Risk tracking can include use of metrics.
5. Control	A. Process in which decisions are made based on the data presented in the tracking reports. This ensures that the risk is continually and effectively managed. B. Decisions are based on current information as well as experience and must respond to changing conditions. C. Risk decisions and current mechanisms should be integrated with standard project management practices. D. Utilize tracking data to determine how to proceed with risks (close, continue tracking and executing the current plan, re-plan, or invoke a contingency plan).
6. Communicate and Document	A. Communication and Documentation: provide information and feedback to the program on risk activities, risk status, and potential new risks. B. Ensures the documentation and visibility of risk information for better management.